Exergy and Energy Analysis of Low Temperature District Heating Network

Li, Hongwei; Svendsen, Svend

Publication date:
2011

Document Version
Publisher's PDF, also known as Version of record

The 24th International Conference on Efficiency, Cost, Optimization,Simulation and Environmental Impact of Energy Systems. Novi Sad, Serbia, 2011

Exergy and Energy Analysis of Low Temperature District Heating Network

Hongwei Li[a], Svend Svendsen[b]

[a]Civil Engineering Department,
Technical University of Denmark, Denmark
Building 118, Brovej
DK-2800 Kgs.Lyngby, Denmark
Email: hong@byg.dtu.dk

[b]Civil Engineering Department,
Technical University of Denmark, Denmark
Building 118, Brovej
DK-2800 Kgs.Lyngby, Denmark
Email: ss@byg.dtu.dk

Abstract

Low temperature district heating (LTDH) with reduced network supply and return temperature provides better match of the low quality building thermal demand and the low quality waste heat supply. In this paper, an exemplary LTDH network was designed for 30 low energy demand residential houses, which is in line with a pilot project that is carrying out in Denmark with network supply/return temperature at 55^{o}C/25 ^{o}C. The consumer domestic hot water (DHW) demand is supplied with a special designed district heating (DH) storage tank. The space heating (SH) demand is supplied with a low temperature radiator. The network thermal and hydraulic conditions were simulated under steady state with an in-house district heating network design and simulation code. Through simulation, the overall system energetic and exergetic efficiencies were calculated and the exergy losses for the major district heating system components were identified.